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Identifiers-Instructional Concepts Inventory

Some 180 kindergarten children from low income families were tested midway through the school year on an instructional concepts inventory created by the Southwest Regional Laboratory for Educational Research and Development (SRL). The inventory was designed to measure the basic concepts known by a child. It is specifically geared to test kindergarten pupils for their skill with concepts necessary for successful achievement in the first grade. The inventory draws from a list of 86 concepts grouped into seven categories: color, size, shape, position, amount, time, and equivalence. The inventory, as used in this study, had 36 items involving the seven categories. Each item consisted of a picture illustration of a concept and two distractors. Each child tested was asked to point to the illustration of the concept named by the examiner. The test results showed that, on an average, the subjects knew about 23 of the 36 concepts. The results indicated that kindergarten children from low income families needed instruction in the basic concepts. SRL is developing a program to teach the basic concepts measured by this inventory. (WD)

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PERFORMANCE OF KINDERGARTEN CHILDREN FROM LOW INCOME FAMILIES ON SELECTED CONCEPT CATEGORIES

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Certain skills are prerequisite for children entering first grade. Without them, children fail. Kindergarten instruction and preschool programs like Head Start are being increased to ensure that these fundamental skills are acquired by the time children enter first grade. Among these skills are basic concepts essential to learning in subsequent grades. The Southwest Regional Laboratory is developing a program to teach these concepts to kindergarten children. In developing this Instructional Concepts Program, the Laboratory is attempting to determine what concepts children should know, and what concepts they have already mastered.

There is very little existing research as to what concepts children should and do know. Three types of studies are relevant to children's knowledge of concepts. First is research which requires children to use concepts to solve problems. (King, 1963) Second is research related to determining children's knowledge of basic principles of subject matters. (Helgeson, 1968) Finally, there are studies that require children to simultaneously attend to two or more concepts. (Lee, 1965) Although all of these studies test concept knowledge, they do not pinpoint the exact knowledge children have of individual concepts. This is because the responses they require are contingent upon either knowledge of several concepts simultaneously or knowledge of concepts in conjunction with other abilities.

METHODS

To determine what concepts children should know, the Laboratory, in 1967, began to review three first-grade curriculum guides used in Southern California. All concepts assumed known to first graders that appeared in two of the three guides were considered. Those concepts not referring to specific objects (e.g., house, dog, tree, etc.) and not overlapping, were adopted for the program. The original list of concepts was revised into the present list on the basis of (1) suggestions from primary-grade teachers and curriculum specialists, and (2) individual assessment of kindergarten children on tasks involving use of the various concepts. The latest list has 86 concepts grouped into seven categories: color, size, shape, position, amount, time, and equivalence. A list of the concepts comprising each category appears in Table 1.

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Materials

To measure the degree to which kindergarten children already know the Program's concepts, an Instructional Concepts Inventory was constructed. Five concepts were randomly sampled from each of the Program's seven concept categories except time. Only one time concept was sampled because of the length of questions required to test performance in that category. One test item was constructed for each of these concepts and an additional five items were constructed to test the conjunction of those belonging to different categories. Such items required children to identify such things as shapes that were of a certain color, or objects that were of a certain size and in a certain position relative to other objects. Concepts tested in conjunction with each other were randomly sampled from those already selected for the test. The completed Inventory had a total of 36 items, each consisting of a picture illustration of a concept and two distractors. Identification responses rather than naming responses were employed because the formulation of easily understood name-response questions for some concepts is extremely difficult without use of the concept name or class name. Examples of test items used in each category appear in Table 2.

Subjects

One hundred and eighty-one kindergarten children from low-income families were tested in two schools in Southern California in January of this year. Sixty percent of the families in one school are on welfare. To be eligible for welfare requires an annual income below $3000. Fifty percent of the children qualify for Head Start, and the school qualifies for participation in the Model Cities Program. The other school participates in Head Start.

Procedures

The Inventory was administered to the children individually. Test administration time varied from 6 to 7 minutes for each child. Each child was asked to point to the illustration of the concept named by the examiner.

Teachers identified those Spanish-speaking children that could not speak more than six English words. Test directions were given to them in Spanish, while test questions were asked in English. This procedure precluded the failure of a subject merely because he did not understand the directions about how to take the test.

RESULTS

Test results are shown in Tables 3 and 4. Table 3 shows the mean for all classes was 23.57 of a possible 36, and the standard deviation was 5.69. Since a mean of 12 was possible by chance, corrections were made for guessing. The corrected population mean is 17.36. Ranked uncorrected means for concept categories indicate highest performance on color and lowest performance on time concepts.

An analysis was made of the performance of those children designated as non-English speakers by their teachers. Table 4 shows the mean of this group was more than one standard deviation below the population mean. They were also consistently below the population mean for each concept category.

A comparison of the ranked means of concept categories for the non-English speaking group and the population shows that they both tended to score highest and lowest on the same categories. The only substantial difference in relative performance on categories seems to be with conjunction. Non-English speaking group performance on conjunction relative to other categories is lower than that of the entire population.

A reliability coefficient for the measuring instrument of .75 was obtained using the Kuder-Richardson Formula 21.

DISCUSSION

High mean scores for categories such as color could result from the fact that when the test was administered, the children had already received half a year's instruction. One may reasonably expect scores to be lower for children just entering kindergarten.

The overall population means and the means for concept categories indicate that kindergarten children from low income families need instruction on the concepts to be taught in the Southwest Regional Laboratory's Instructional Concepts Program. A large variation is evidenced by the standard deviation and the differences in mean scores between children who speak English and those who do not. This indicates that attempts should be made to design a program of instruction to account for the different entering behaviors of the children for whom the program is being designed, especially those children with language handicaps.

References

Helgeson, Stanley L. The Relationships Between Concepts of Force Attained and Maturity as Indicated by Grade Levels, Center for Cognitive Learning, Technical Report No. 43, University of Wisconsin, March, 1968.

King, W. H. The Development of Scientific Concepts in Children: II. British Journal of Educational Psychology, 1963, 33, 240-252.

Lee, C. Lee. Concept Utilization in Preschool Children, Child Development, 1965, 36, 221-227.

[1] TABLE 1

Concepts and Concept Categories

Color	Shape	Size	Amount	Position	Equivalence	Time
red	circle	larger	least	above	same	before
blue	square	smaller	most	below	different	after
yellow	triangle	shorter	more	between	equal	
brown	triangle	longer	less	over	not equal	
black	rectangle	taller	all	under		
white	straight-	largest	some	beside		
orange	line	smallest	none	inside		
purple	curved-	medium-	no	outside		
green	line	sized		behind		
		shortest		in front		
		tallest		next to		
		longest		around		
		thin		top		
		thick		bottom		
		thicker		side		
		thinner		front		
				middle		
				end		
				1st		
				2nd		
				3rd		
				4th		
				back		
				beginning		
				end		

[1] Handout to accompany paper entitled "Performance of Kindergarten Children from Low Income Famileies on Selected Concept Categories" by Craig Locatis and Frank A. Smith, Southwest Regional Laboratory, 11300 La Cienega Blvd., Inglewood, Calif. 90304. Presented at annual meeting of California Education Research Association, Los Angeles, March 14-15, 1969.

TABLE 2

Examples of Test Items in Each Category

I. COLOR

"Point to the green bird."

II. SHAPE

"Point to the circle."

III. SIZE

"Point to the largest turtle."

IV. AMOUNT

"Point to the bowl with the most ice cream."

V. POSITION

"Point to the monkey at the beginning of the line."

VI. EQUIVALENCE

"See this cat?" (Point to the cat in the margin.) "Point to a cat over here that is the same color."

VII. CONJUNCTIVE

"Point to the triangle under the line."

VIII. TIME

(Point to each picture in turn and tell the following story.) "Here is a boy sleeping in bed in the morning. Now he wakes up. Here he is going to school. Point to the picture that shows the boy before he woke up."

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TABLE 3

Population Performance Data

Population Mean: 23.57 Corrected Mean: 17.36

Standard Deviation: 5.69

Ranked Category Means (5.00 possible):

1.	Color	4.27
2.	Size	3.82
3.	Conjunction	3.42
4.	Amount	3.23
5.	Shape	2.92
6.	Equivalence	2.89
7.	Position	2.86
8.	Time	.26 (1.00 possible)

TABLE 4

Performance of Non-English Speakers*

Overall Group Mean: 16.80 (36 possible)

Ranked Concept Categories:	Means
1. Color	3.30
2. Size	2.70
3. Shape	2.60
4. Amount	2.10
5. Equivalence	2.10
6. Position	1.70
7. Conjunction	1.70
8. Time	.10 (1.00 possible)

*Students who spoke less than six English words as designated by their teachers.